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the \$106,687 given as "The Annual Appropriation for Salaries of Instructing Staff" is actually spent for the salaries of the instructing staff.

The absurdity of the conclusions raises the question of what is meant by "The Annual Appropriation for Salaries of Instructing Staff," which has been used as the basis of classification of the American colleges and universities. One would naturally think that it means the money spent on the salaries mentioned. If it does mean this, it is clear that Bryn Mawr College has received too advanced a position in the classification.

With great latitude allowed, the phrase might perhaps be interpreted as meaning money available for salaries though not necessarily so spent. This interpretation is particularly improbable in the case of Bryn Mawr College. Its alumnae have been trying during the last few years to obtain gifts of money from the friends of the college for an endowment fund, the interest on which is to be used to increase the salaries of the professors. In order to retain the older and better known members of the faculty in spite of offers from other institutions, the alumnae wish to have the salary of a professor raised from \$2,500, which has been the salary attaching to that grade, to \$3,000. They have already accumulated nearly \$100,000 toward this fund. If in the foregoing calculation we insert \$3,000 in the place of \$2,500 as the salary of a professor, it appears that an annual appropriation of \$106,687, if available, would not only have met this increased demand but would also have sufficed to have given the instructors of lower ranks, namely, lecturers, readers and demonstrators, an average salary of \$2,412.46. Making similar changes in the two other academic years considered, this average salary could have been \$2,260.38 and \$1,871.50. The calculation leaves no doubt that Bryn Mawr College if it had \$106,687 actually available annually for the salaries of the instructing staff would be able, unaided, to raise the salaries as the alumnae desire.

DAVID WILBUR HORN,
Associate and Associate Professor of Chemistry
in Bryn Mawr College, 1901-7

AIR-SHIPS, PAST AND PRESENT

TO THE EDITOR OF SCIENCE: In a review of "Air-ships, Past and Present" presented in SCIENCE, July 3, 1908, pp. 20-21, I notice that O. Chanute, the reviewer, gives 21,100 feet as the greatest altitude above the earth's surface heretofore attained by kites.

I do not know whether this statement was made in ignorance of the Weather Bureau kite flight of October 3 last, or not; but in any case you may wish to note in your journal, if not already there recorded, the following facts:

On October 3, 1907, one of the international dates for scientific kite flights, the Weather Bureau observers at Mt. Weather, Va., succeeded in raising a meteorograph to an altitude of 23,110 feet above mean sea level by means of kites. At that altitude the wind was WNW, the temperature -5.4° F. For the flight 37,300 feet of piano wire was used and the number of kites required to lift were eight having a total lifting surface of 505 square feet.

CLEVELAND ABBE, JR.

SCIENTIFIC BOOKS

Heredity. By J. ARTHUR THOMSON, Regius Professor of Natural History in the University of Aberdeen. New York, G. P. Putnam's Sons. 1908.

So much interest is now concentrating on the problems of heredity as a result of the abundant and important observations that have been carried on in recent years, following the leads of Mendel, DeVries and Galton, that a critical estimate of our present knowledge of the phenomena of inheritance can not fail to be of interest. Such an estimate Professor Thomson endeavors to give in the volume before us, which the author speaks of as an "introduction to the study of heredity," and which, it may be said at once, is a book well worth careful reading, bringing together as it does in a concise form the results of observations widely scattered in scientific periodicals, not always readily accessible and all more or less deterrent to the layman.

The author has endeavored to approach his subject *sine irâ et studio* and to a large extent he has been successful. He avowedly sails,

however, under the flag of Weismannism and nails this flag firmly to the mast, refusing to believe, for example, that any explanation of the regeneration of a *Stentor* or a *Hydra* is possible "apart from the postulate of diffusely distributed 'specific units.'" True, he admits that determinants are "scientific fictions," that they are elements of a "symbolic notation" to be discarded so soon as it is shown to be inconsistent with demonstrable facts, but nevertheless he believes that heredity can be discussed and understood at present only on the assumption of the existence of such material bases of inheritance. But that such a concept is merely carrying the difficulty a step farther back is not considered. The determinants are living entities which grow and reproduce, vary and inherit, even as the cell, and, admitting their existence, we are still far from understanding the ultimate causes of the phenomena of heredity. Indeed, it would seem that the problem of heredity and the problem of life are fundamentally the same, or, at all events, that the solution of the one is dependent on that of the other, for, as Professor Thomson puts it, "the organism and its inheritance are, to begin with, one and the same." But a complete comprehension of the ultimate causes of life, of organization and of inheritance is yet of the future, and it must be admitted that the concept of determinants or specific material units furnishes a convenient "notation" for the discussion of certain phenomena of inheritance; it is not, however, the only concept possible, and it is to be regretted that its dominance in Professor Thomson has rendered him somewhat intolerant of epigenetic possibilities.

The book starts with definitions of heredity and inheritance, and proceeds to discuss the physical basis of inheritance, the germ cells, their maturation and fertilization. Then follows a discussion of variation, which is classified as fluctuating and discontinuous, a consideration of the latter leading to a criticism of the mutation theory of DeVries; and, similarly, a chapter is devoted to modes of inheritance, which are classified as blended, exclusive (preponderant, although discarded

by the author, seems preferable) and particulate. A remarkably sane discussion of reversion follows, the phenomenon being regarded as of rare occurrence, and many of the cases usually referred to it, such, for instance, as the classic one of supernumerary mammae, are properly excluded. Reversion is defined as including "all cases where, *through inheritance*, there appears in an individual some character or combination of characters which was not expressed in his immediate lineage, but which had occurred in a remoter but not hypothetical ancestor." With a discussion of telegony and maternal impressions, in which again a thoroughly judicious position is taken, and of the inheritance of acquired characters, concerning which the author's Weismannian convictions determine his position, the exposition of what may be termed the illustrative side of the question is concluded, this having occupied approximately one half of the volume.

A most interesting chapter on heredity and disease precedes one on the statistical study of inheritance, and this is followed by a consideration of the results of experimental studies, in which the Mendelian phenomena are discussed. Then follows an account of the theories of heredity, a relatively brief historical review preceding an exposition of Weismann's theories, and after a consideration of heredity and sex and of sex determination, the book concludes with a most suggestive and admirably expressed discussion of the social aspects of the question.

This summary of the contents of the book will indicate the breadth of its scope and the thoroughness with which its subject is discussed. Criticism is, of course, possible, but the errors against which it must be directed are rather of omission than of commission. One would have wished, for instance, a fuller statement of the method and results of the statistical study of heredity, the chapter upon that topic being principally a discussion of Galton's views of inheritance, and space for the enlargement of the chapter could have been obtained by a curtailment of that devoted to Weismann's theories, which have already been made familiar to English readers. A

consideration of the results of Morgan and Seeliger, and especially of those of Godlewski, would probably have modified the deduction drawn from Boveri's experiments on the fertilization of non-nucleated fragments of echinoderm eggs, as to the all-importance of the chromosomes in inheritance; and, similarly, no notice is taken of the work of Herbst and Doncaster, whose results antagonize those of Vernon on the influence of over-ripeness of the germ cells in the determination of the two parents in inheritance. But these and the few other imperfections that might be noticed do not interfere materially with the value of the book. It fulfils its purpose as an "introduction to the study of heredity" excellently well, it is rich in illustrative facts and judicious criticism, and is written in a style which is clear, consecutive, forcible and, at times, even picturesque.

It should be added that there is a good index, a bibliography of representative papers on heredity occupying forty-eight pages, and a very useful subject-index to the bibliography.

J. P. McM.

Mind in the Making. By EDGAR JAMES SWIFT, Professor of Psychology and Pedagogy in Washington University, St. Louis. New York, Charles Scribner's Sons. 1908. Pp. viii + 329.

Professor Swift's book is of real value to both investigators in educational psychology and students of college grade. The former class will find in it data of importance on the youthful delinquencies of people whose adult lives were decidedly above the average in conventional and probably in real morality, on the variability of intellectual achievement and on the influence of the knowledge of one or more foreign languages upon the learning of another. This last set of facts is especially important because it represents the co-operation of a teacher in service (Mr. William W. Hall, of the Yeatman High School in St. Louis) with a psychologist in an experiment conducted under class-room conditions. Such school-room experiments, comparable to the scientific work now being done in hos-

pitals or on experimental farms, are a most hopeful sign that education is to be rationalized by science.

The data reported by Professor Swift support the conclusions: (1) that youthful irregularities in the way of theft, intemperance and the like are distributed amongst individuals continuously from a condition of complete lawlessness to that of complete "goody-goodyness," (2) that their presence then is consistent with a higher than average restraint from crime in adult life; (3) that individual differences in intellectual capacities are so great as to be of great practical importance, and (4) that the influence of training with one foreign language upon efficiency in learning another does not consist, to any considerable extent, in a subtle discipline of general mental functions. These conclusions, though doubtless acceptable to observant and matter-of-fact thinkers, have all been contradicted by theorists concerning education and by the practises recommended by leaders in educational administration.

Competent students of education in college classes and amongst teachers in service will profit by the study of these data and those repeated from Professor Swift's more familiar researches in the psychology of learning. For such the book contains also a descriptive account, with illustrative cases, of the influence of defects in vision, chorea, hysteria and the like upon education, a review of certain aspects of brain anatomy and physiology, a critique of the rigidity and narrowness of present curricula and methods of teaching, and a chapter on the nature of the educative process. All of these should be very useful.

The influence of the report of cases of eminent men and women who did not succeed in schools is more doubtful. It tends, probably without the author's desire, to give the impression that failure to achieve in school is a sign of success out of school and even that failure in early life is a sign of success later. The discussion of the criminal tendencies of boys may also, if taken too naively, lead to the expectation that juvenile delinquency is *per se* a healthy stage in a desirable